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Fruechtenicht

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(54) **HIGHLY MANEUVERABLE STEERABLE RIDING DEVICE FOR TRANSPORTING LOADS**

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(51) **Int. Cl.**

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B60P 9/00	(2006.01)
B62D 51/02	(2006.01)
B60L 50/50	(2019.01)

(52) **U.S. Cl.**
CPC ***B60P 9/00*** (2013.01); ***B60L 50/50*** (2019.02); ***B62D 51/005*** (2013.01); ***B62D 51/02*** (2013.01); *B60L 2200/40* (2013.01)

(58) **Field of Classification Search**
CPC B60P 9/00; B60L 50/50; B60L 2200/40; B62D 51/02; B62D 51/005
See application file for complete search history.

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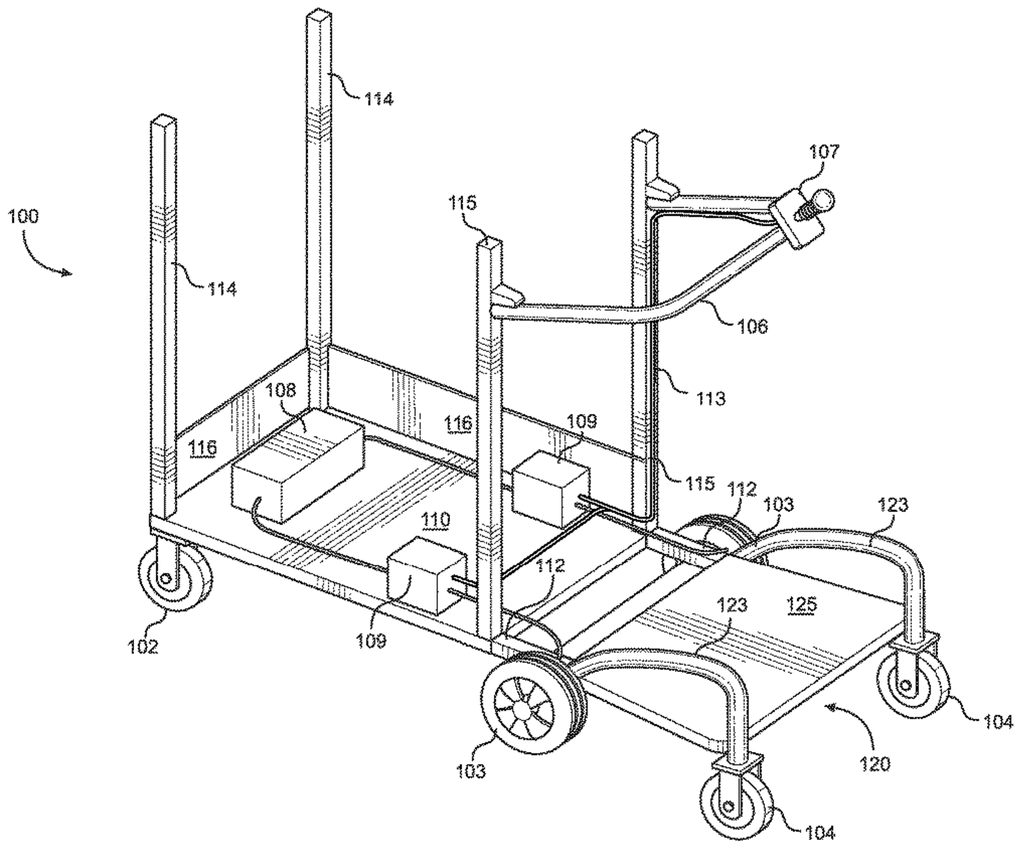
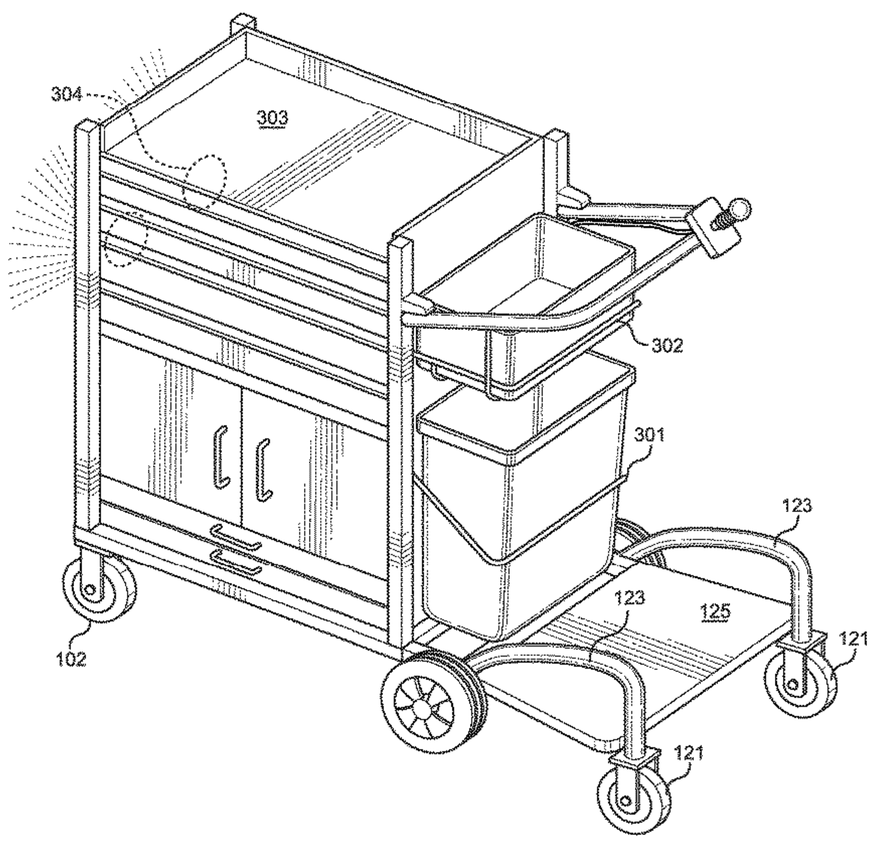
(57) **ABSTRACT**

A riding device for transporting a load and a human with three sets of laterally spaced wheels, and a foot stand assembly suspended above the riding surface, wherein a user may stand on the foot stand assembly and steer the riding device. The device comprises a first set of swivel caster wheels, a second set of drive wheels, and a third set of foot stand assembly wheels connected with a frame and load bearing platform. The riding device preferably uses a battery as a power source, and is sized to fit through doorways, hallways, and into elevators so that it may be used inside or outside to transport tools or other equipment.

13 Claims, 3 Drawing Sheets





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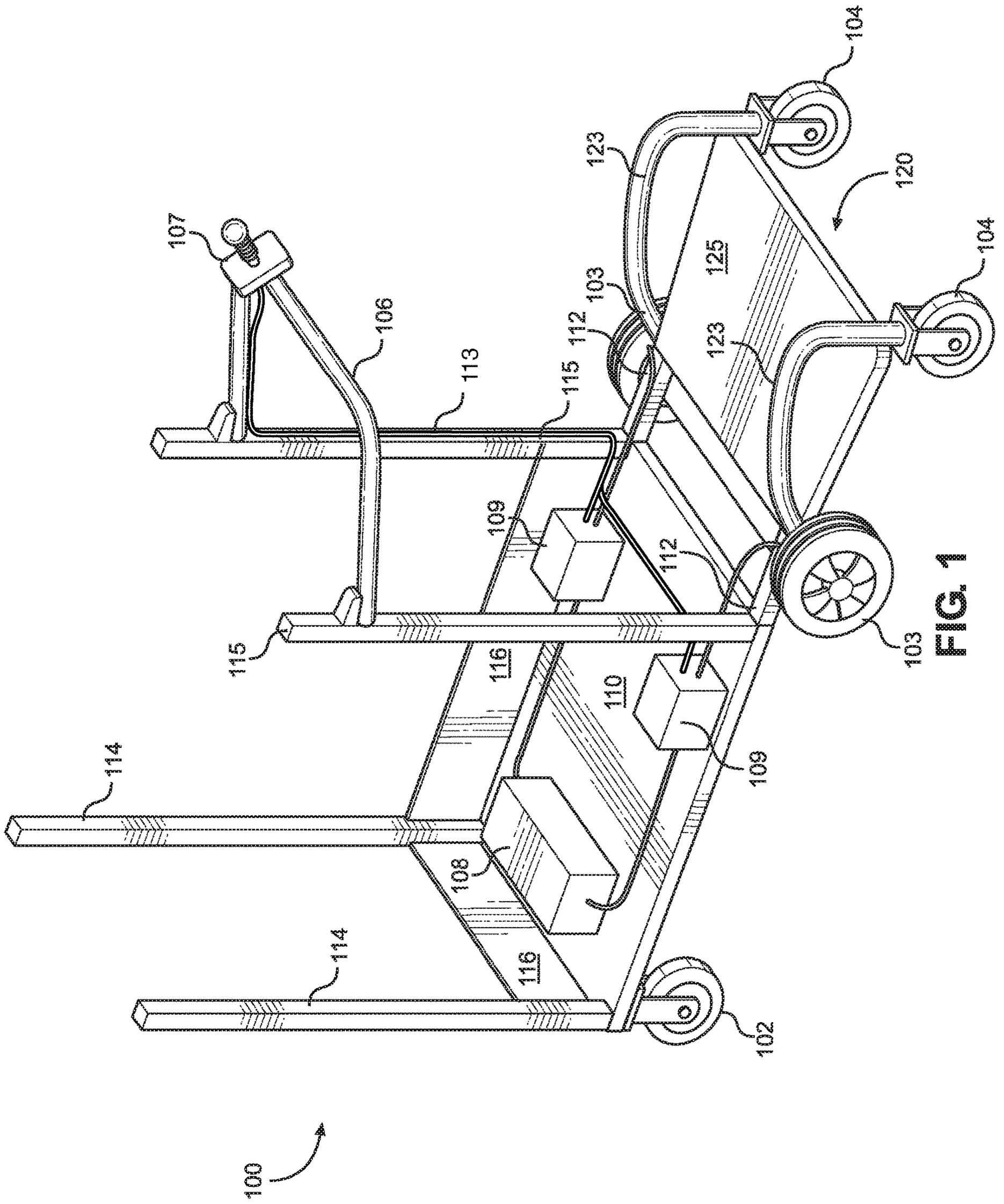
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FIG. 1

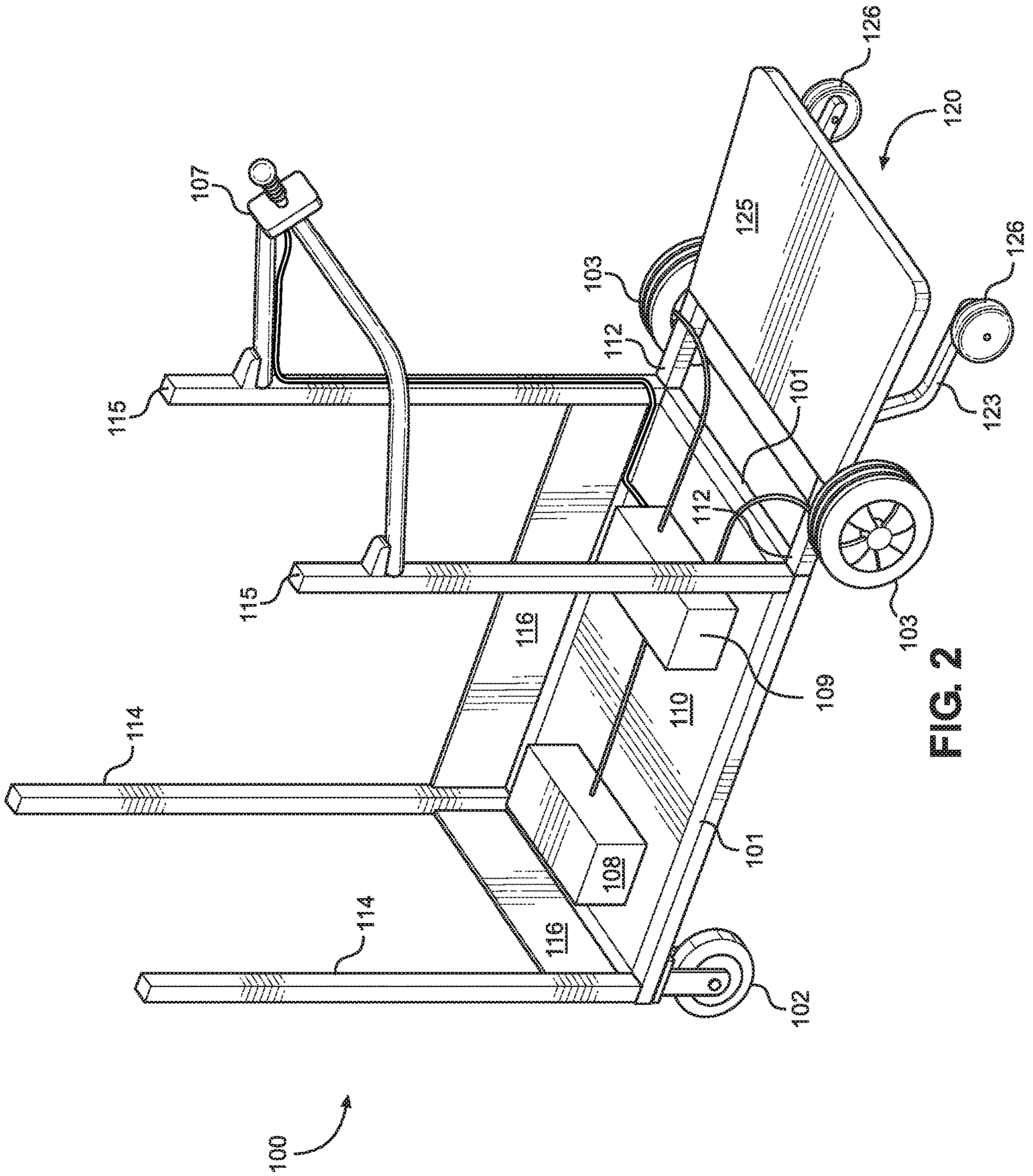
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FIG. 2

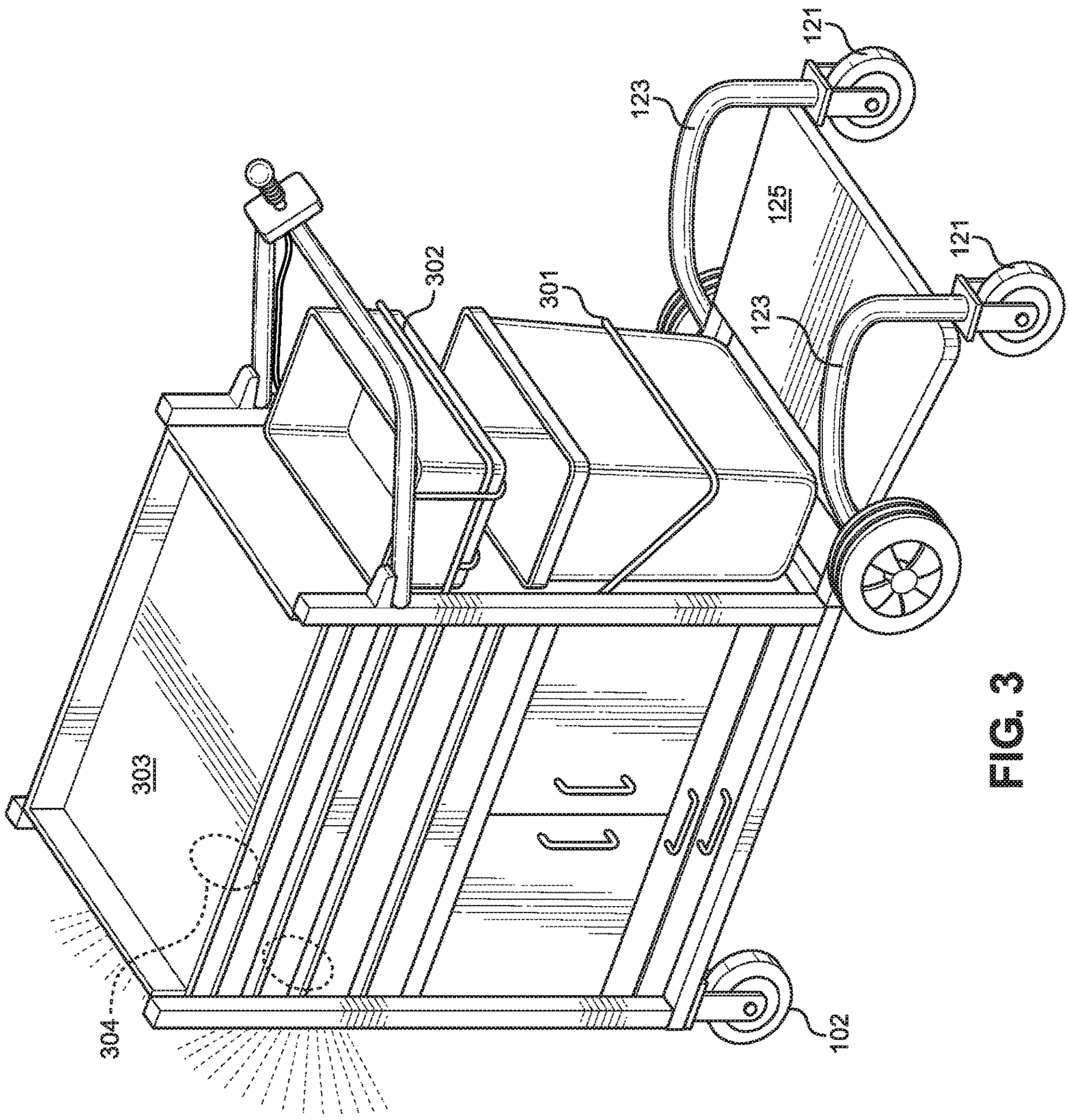

FIG. 3

HIGHLY MANEUVERABLE STEERABLE RIDING DEVICE FOR TRANSPORTING LOADS

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. provisional patent application No. 62/750,197, filed Oct. 24, 2018, which is incorporated herein in its entirety.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

Not applicable.

NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT

Not applicable.

STATEMENT REGARDING PRIOR DISCLOSURES

Not applicable

BACKGROUND OF THE INVENTION

Many business campuses, university campuses, cities, towns, and others are attempting to reduce the use of internal combustion engines to power vehicles used on-site. Many sites may not have formal roads, but may have paths, sidewalks, or hallways connecting various buildings within a site. Likewise, many residential facilities or other buildings often need repairs within a building.

The invention relates to maneuverable devices for transporting equipment, tools, or other items, and a user, along roads, pathways, hallways, in elevators, or in other situations where there may be tight corners and narrow accessways, and where it may be undesirable to use an internal combustion engine.

BRIEF SUMMARY OF THE INVENTION

The invention comprises a riding device that is capable of carrying heavy loads and a user over a variety of surfaces, with a high degree of maneuverability allowing a user to steer the device around tight corners, up and down ramps, into and off of elevators, along hallways and narrow pathways, all while transporting loads. This is especially useful for workers at university or business campuses that need to transport equipment around the campus to perform their work.

The invention comprises at least one load-bearing platform connected with a frame. A first set of laterally spaced swivel caster wheels are connected with the front end of the frame. A second set of laterally spaced drive wheels are connected with the back end of the frame. In a preferred embodiment, the frame width is preferably sized to connect with the laterally spaced wheels and allow the entire device to fit through an internal doorway. The frame length may be of any length desired.

In a preferred embodiment, the frame is connected with a load bearing platform that supports a power source to provide power to the device. The power source may preferably be a battery, but could be solar powered, an internal combustion engine, or any power source known in the art. In a preferred embodiment the power source is connected with two motors, and each motor powers one drive wheel in the second set of wheels, allowing movement and turning. In other embodiments, a single motor may be connected via a drivetrain to each wheel in the second set of laterally spaced wheels, to allow movement and turning.

The frame may have essentially any shape or structure desired. In some embodiments, the frame supports attachments for holding tools, equipment, or any other desired items. As non-limiting examples, the frame may support additional platforms, an equipment box, a tool box, an industrial-sized laundry basket, a wine cart, or any other load that can fit on the device. The frame may be embellished with additional accessories, as needed. As non-limiting examples, headlights, flashing lights, or specialized racks for holding tools may be added to the device.

A third set of laterally spaced wheels extends back from the back end of the frame, and behind the second set of laterally spaced wheels. The third set of laterally spaced may be swivel caster wheels, or regular wheels.

A foot stand is positioned between the third set of laterally spaced wheels and behind the frame. The foot stand is connected with the frame. Each wheel in this third set of laterally space wheels is connected with, and extends from, the back of the frame, one from the back left side and the other from the back right side. The foot stand is suspended above the level of the riding surface, and is capable of supporting the weight of a human while so suspended.

The frame may include vertical support members. In a preferred embodiment, the vertical support members are connected with hand grips, allowing a user to grip the frame. A steering mechanism may be connected with the frame. The handgrips, foot stand, and steering mechanism are disposed so that a user may stand on the foot stand, grip the handgrips of the frame, and steer the device. This allows for accurate steering, while also allowing for transport of loads to areas that are inaccessible by standard motorized vehicles.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS

FIG. **1** is a perspective view of an embodiment of the invention.

FIG. **2** is a perspective view of an embodiment of the invention.

FIG. **3** is a perspective view of an embodiment of the invention with additional exemplary optional features, as non-limiting examples, a tool box, a basket, and a rack for holding items.

DETAILED DESCRIPTION OF THE INVENTION

The invention comprises a riding device that is capable of carrying heavy loads and a user over a variety of surfaces while providing a high degree of maneuverability. The embodiments described below are set forth as examples, and not as a limitation on the scope of the invention.

Riding device **100** comprises frame **101**, three sets of laterally spaced wheels, a power source, at least one motor, a steering control mechanism, and a foot stand assembly. Frame **101** may be of any shape as needed to accommodate the power source, at least one motor, and any frame structure additions as needed for carrying tools or other items.

The width of the device is preferably a width that fits through a standard internal doorway. It is apparent that the width of riding device **100** may be any width as needed to

accomplish the goal of allowing riding device **100** to move in an unobstructed manner. Thus, if riding device is used along pathways that are wider than a standard internal doorway, the width of riding device may be wider than the width of a standard internal doorway.

In some embodiments frame **101** and platform **110** may be integrated so that platform **100** comprises part of frame **101** as shown in FIG. **1**. In other embodiments, frame **101** may be comprised of up to four frame members **101** connected at 90 degree angles to form a rectangle or square as shown in FIG. **2**. In this embodiment there is a left side frame member **101**, a right side frame member **101**, a front frame member **101**, and a back frame member **101**. Platform **110** may be supported by frame members **101**.

The front end of frame **101** is connected with a first set of laterally spaced swivel caster wheels **102**, with a left side swivel caster wheel attached proximate to the front left side of frame **101**, and a right side swivel caster wheel attached proximate to the front right side of frame **101**.

The back end of frame **101** is connected with a second set of laterally spaced drive wheels **103**, with a left side drive wheel is attached proximate to the back left side of frame **101**, and a right side drive wheel is attached proximate to the back right side of frame **101**. In some embodiments, a set of frame extensions **112** may attach the second set of wheels proximate to the frame. In other embodiments drive wheels **103** may be directly connected with frame **101**. Drive wheels **103** may be directly or indirectly attached proximate to the back of frame **101** by any means known in the art.

Foot stand assembly **120** is securely connected with the back end of frame **101** so that foot stand platform **105** is suspended above the level of the riding surface while supporting the weight of a human. The third set of laterally spaced wheels may help suspend and support the foot stand assembly. Foot stand assembly **120** may be directly connected with frame **101**. Or, in other embodiments foot stand assembly **120** may be connected with frame **101** by frame extensions **112**. Foot stand assembly **120** may be indirectly connected with frame **101** through as many frame extensions **112** as needed or desired. Foot stand assembly may be connected with frame **102** by any means known in the art to securely connect foot stand assembly **120** with frame **101** to suspend foot stand platform **105** above the riding surface while supporting the weight of a human.

Frame **101** may further comprise a left front vertical frame member **114** and a right front vertical frame member **114**. Front vertical frame members **114** may provide structural support to the device and may be used to support any attachments or equipment that may be carried on the riding device **100**.

Frame **101** may further comprise a left back vertical frame member **115** and a right back vertical frame member **115**. Back vertical frame members **115** may provide structural support to the device and may be used to support any additional frame structures or equipment that may be carried on riding device **100**.

At least one back vertical frame member **115** is connected with hand grip **106**. Hand grip **106** may be a single unit as shown, or may be two separate units, one for each hand. It is apparent that hand grip **106** may be of any shape or structure sufficient to provide a place for human hands to grip and hold onto riding device **100**.

In a preferred embodiment at least one back vertical member **115** is connected with steering control mechanism **107**. Steering control mechanism **107** transmits steering input to drive wheels, via motors **109**. In some embodiments, steering control mechanism **107** transmits steering input to motors **109** through connection wires **113**. In other embodiments, steering control mechanism **107** transmits steering input to motors **109** through a wireless connection. In a preferred embodiment a first motor **109** is connected with a first drive wheel **103**, and a second motor **109** is connected with a second drive wheel **103**. Steering control mechanism **107** transmits steering input to motors **109**, and in response each motor **109** transmits force to rotate one drive wheel **103**. Each motor **109** may transmit force to one drive wheel **109** by a mechanical connection, or by a wired connection, or by a wireless connection. A user may steer riding device **100** by manipulating steering control mechanism **107**.

The back end of frame **101** may comprise a left vertical support member **115** and a right vertical support member **115**. Vertical support members **115** may comprise part of the support frame. Steering control mechanism **107** may be connected with one or more of these vertical members, allowing a user to stand on foot stand assembly **120**, grip hand grip **106**, and steer the device by providing steering input to steering control mechanism **107**. This allows for highly maneuverable and accurate steering, while also allowing for transport of loads to areas that are inaccessible by standard motorized vehicles.

Steering control mechanism **107** is manipulated by a user. After receiving input from the user, steering control mechanism **107** transmits steering input to the drive wheels to steer the device. In a preferred embodiment, steering input is transmitted from steering control mechanism **107**, by connection wires **113**, to at least one motor **109**. Each motor **109** is connected with and provides rotational force to one drive wheel **103**. In other embodiments, steering control mechanism **107** sends steering input to a drivetrain, connected with each wheel.

In some embodiment, the steering mechanism is a joy-stick that transmits steering input from the joy-stick to motors **109**. In other embodiments steering mechanism **107** may be a steering wheel, or any other device known to permit steering.

Frame **101** is connected with at least one load-bearing platform **110**. Platform **110** and frame **101** each have a front end, a back end, a left side, a right side, a length, and a width that correspond with each other. Platform **110** and frame **101** each have a depth that may or may not correspond with each other. At least one platform **110** may be positioned at any vertical height. Platform **110** may be supported by vertical frame members **114** and **115**, or may be integrated with frame **101**. There may be more than one platform **110** at different heights. At least one platform **110** is a load-bearing platform that is preferably used to support power source **108** and at least one motor **109**. It is apparent that power source **108** and motors **109** may be positioned elsewhere on the device.

In a preferred embodiment, each wheel in the first set of laterally spaced wheels is a swivel caster wheel, as shown in FIG. **1** (herein called "caster wheel(s)"). Each caster wheel is capable of rotating 360 degrees while supporting a load, providing a high level of maneuverability so that riding device **100** may steer around tight corners. It is apparent that regular wheels may be used in the first set of laterally spaced wheels, however, this will decrease the maneuverability of the device.

A second set of laterally spaced wheels is connected with the back end of the frame. In a preferred embodiment, these wheels steer or turn (herein called "drive wheel(s)"). In a preferred embodiment, horizontal frame members **112** may extend rearward from the back end of the frame **101** and

connect with the wheels **103**, as shown in FIG. **1**. A left horizontal frame member **112** connects with left drive wheel **103**, and right horizontal frame member **112** connects with right drive wheel **103**.

In other embodiments, the second set of laterally spaced wheels may be connected directly with the rear end of frame **101**, or connected directly with platform **110**. The second set of wheels are preferably regular wheels, rather than caster wheels. However, caster wheels may optionally be used for the second set of laterally spaced wheels.

The device further comprises a third set of set of laterally spaced wheels. These wheels may be swivel caster wheels, capable of swiveling 360 degrees, as shown in FIG. **1**. Or they may be regular wheels, as shown in FIG. **2**.

Riding device **100** is powered by power-source **108**. Power-source **108** is connected with motors **109** to provide power to run motors **109**. In some embodiments, power-source **108** is a battery. This is preferable on campuses or indoors where internal-combustion engines are prohibited or unwanted. In other embodiments, riding device **100** may be powered by an internal combustion engine, or solar power, or by any other means known to provide power to a motor. Power source **108** provides power to motors **109**, which in turn transmit force to rotate drive wheels **103** to move and steer the riding device. There may be one or two motors **109**.

Power source **108** and motors **109** are preferably positioned on, and supported by, load-bearing platform **110**. However, power source **108** and motors **109** do not have to be located on platform **110** and may be located elsewhere on the device.

In a preferred embodiment one motor **109** is connected with one drive wheel **103**, so that there are two motors **109** in riding device **100**. Riding device **100** moves when at least one motor transmits force to rotate the connected drive wheel. Rotation of at least one drive wheel causes the riding device to move. Riding device moves forward when both motors **109** rotate both drive wheels **103** in a forward direction. Riding device **100** moves backwards when both motors **109** rotate drive wheels **103** in a backward direction. Steering is accomplished by having a first motor **109** power a first drive wheel to rotate forward, while a second motor **109** powers a second drive wheel to rotate backward, causing riding device to turn in a first direction. Reversing this, and having the first motor **109** power the first turning wheel **103** to rotate backward, while the second motor **109** powers the second turning wheel **103** to rotate forward causes the riding device to turn in a second direction. This provides the ability to move and to steer the device.

The third set of laterally spaced wheels **104** may connect with the back of frame **101** through at least one set of extensions **123**, as shown in FIG. **1**, or they may connect with foot-stand assembly **120**, or they may be securely connected with frame **101** or foot stand assembly **120** by any means known in the art. The third set of wheels provides additional stability to the device, and helps prevent the device from tipping, or falling backward when going up a ramp, over a bump, or on an inclined riding surface. The third set of wheels also may support foot stand assembly **120**.

One wheel in this third set of laterally space wheels is a left wheel and is positioned proximate to the left side of foot stand platform **125**, and a second wheel is right wheel and is positioned proximate to the right side of foot stand platform **125**.

The third set of wheels **104** is positioned behind the second set of wheels. The order of the sets of wheels, from the front of the device to the back of the device, is the first set of wheels (the caster wheels), second set of wheels (the drive wheels), and the third set of wheels (the foot stand wheels).

The foot stand assembly **120** is preferably positioned between the third set of laterally spaced wheels **104**. The foot stand assembly is comprised of a foot stand platform **105** that has a front end, back end, left side, and right side, a length, a width, and a depth. The width of the foot stand platform **105** is preferably sized to fit between the foot stand wheels **104**, and to accommodate the feet of a human. The front end of the foot stand is proximate to the back end of frame **101**. The foot stand platform **105** is securely connected with frame **101** so that foot stand **105** is suspended above the riding surface. The foot stand is capable of supporting the weight of a human while so suspended.

Load bearing platform **110** may support a battery **108** or other power source to power to the device, as shown in FIG. **1**. The platform may further support at least one and preferably two motors **109**. Platform **110** has a perimeter defined by a width, a length, a front end, a back end, left side, and a right side. Platform **110** may be connected with at least one vertical wall **116**, wherein the vertical wall **116** is connected with at least one edge of the perimeter. Or there may be up to four vertical walls **116**, each wall connected with one edge of the perimeter of platform **110**. The vertical wall or walls **116** may be used retain items, and to provide additional structural support.

The width of the load-bearing platform is sized to connect with the laterally-spaced wheels, and fit through any structures or along any pathways as needed. The platform length may be of any length desired.

The riding device frame **101** and platform **110** may be configured to support tools, equipment, or any other desired items. In one embodiment, as shown in FIG. **3**, frame **101** and platform **110** support a tool box. In other embodiments, the platform and frame may support an industrial-sized laundry basket, a wine cart, or any other load that can be sized to fit through a doorway. The frame may have any additions needed. As shown in FIG. **3**, the frame may include additional frame structures to support a basket, or for holding other items. As non-limiting examples, additional frame structure **301** and additional frame structure **302** are shown in FIG. **3**. Riding device **100** may include headlights **304**, flashing lights, turn signals, or any other lighting as needed. It is apparent that riding device may be configured with any additional items or accessories as needed.

It should be understood that the drawings and detailed description are not intended to limit implementations to the particular form disclosed but, on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope as defined by the appended claims. The drawing figures are representational, and are not necessarily to scale. Certain features or components may be shown in somewhat schematic form and some details of conventional elements may not be shown or described in the interest of clarity and conciseness. As used throughout this application, the word "may" is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Similarly, the words "include," "including," and "includes" mean including, but not limited to.

What is claimed is:

1. A riding device for transporting loads and a human comprising:

a frame comprised of a front end member, a back end member, a left side member, and a right side member connected at 90 degree angles to form a rectangular frame base;

a load bearing horizontal rectangular platform integrated with or supported via the rectangular frame base; wherein the frame further comprises a front left vertical frame member, a front right vertical frame member, a back left vertical frame member, and a back right vertical frame member, wherein each vertical frame member extending from corners of the rectangular frame base;

at least one solid vertical wall is connected with a perimeter of the load bearing horizontal platform or attached to two adjacent vertical frame members;

a first set of laterally spaced swivel caster wheels connected with the front end of the frame, wherein a left caster wheel is attached proximate to the front left side of the frame and a right caster wheel is attached proximate to the front right side of the frame;

a second set of laterally spaced drive wheels connected with the back end of the frame, wherein a left drive wheel is attached proximate to the back left side of the frame and a right drive wheel is attached proximate to the back right side of the frame;

a third set of laterally spaced foot stand wheels comprising a left foot stand wheel and a right foot stand wheel in back of the second set of laterally spaced wheels;

a steering control mechanism connected with the back left vertical frame member and the back right vertical frame member, wherein the steering control mechanism transmits steering input to the drive wheels to steer the riding device via at least one motor;

a hand grip is connected with the back left vertical frame member and the back right vertical frame member;

a foot stand assembly securely connected with the back end of the frame;

the foot stand assembly comprising a foot stand platform and the foot stand wheels;

wherein the foot stand platform is suspended above a riding surface and aligned with the load bearing horizontal platform while supporting the weight of a human; and

wherein the left foot stand wheel is positioned proximate to a left side of the foot stand platform and the right foot stand wheel is positioned proximate to a right side of the foot stand platform;

a power source connected with two motors wherein a first motor is connected with the left drive wheel and a second motor is connected with the right drive wheel, wherein in response to steering input transmitted from the steering control mechanism at least one motor transmits force to rotate the connected drive wheel to move and steer the riding device.

2. The riding device of claim **1** wherein steering input is transmitted from the steering control mechanism via the at least one motor by connection wires.

3. The riding device of claim **1** wherein steering input is transmitted from the steering control mechanism via the at least one motor by a wireless connection.

4. The riding device of claim **1** wherein the at least one motor mechanically transmits force to rotate at least one drive wheel to move and steer the riding device.

5. The riding device of claim **1** wherein the power source is a battery.

6. The riding device of claim **1** wherein the foot stand assembly is securely connected with the back end of the frame through at least one set of extensions.

7. The riding device of claim **1** wherein the third set of laterally spaced wheels are swivel caster wheels.

8. The riding device of claim **1** wherein the third set of laterally spaced wheels are non-swivel wheels.

9. The riding device of claim **1** wherein the riding device has a width that fits through a standard internal doorway.

10. The riding device of claim **1** wherein a tool box having drawers, wherein the tool box is integrated with the load bearing horizontal platform and the each vertical frame member such that the at least one solid vertical wall forms a vertical wall of the tool box.

11. The riding device of claim **1** wherein the frame further comprises frame structures that support additional items.

12. The riding device of claim **1** wherein each vertical frame member extends from the rectangular frame base at 90 degree angles such that each vertical frame member is perpendicular to the rectangular frame base.

13. A riding device for transporting loads and a human comprising:

a frame comprised of a front end member, a back end member, a left side member, and a right side member connected at 90 degree angles to form a rectangular frame base;

a load bearing horizontal rectangular platform integrated with or supported via the rectangular frame base; wherein the frame further comprises a front left vertical frame member, a front right vertical frame member, a back left vertical frame member, and a back right vertical frame member, wherein each vertical frame member extending from corners of the rectangular frame base;

a first set of laterally spaced swivel caster wheels connected with the front end of the frame, wherein a left caster wheel is attached proximate to the front left side of the frame and a right caster wheel is attached proximate to the front right side of the frame;

a second set of laterally spaced drive wheels connected with the back end of the frame, wherein a left drive wheel is attached proximate to the back left side of the frame and a right drive wheel is attached proximate to the back right side of the frame;

a third set of laterally spaced foot stand wheels comprising a left foot stand wheel and a right foot stand wheel in back of the second set of laterally spaced wheels;

a steering control mechanism connected with the back left vertical frame member and the back right vertical frame member, wherein the steering control mechanism transmits steering input to the drive wheels to steer the riding device via at least one motor;

a hand grip is connected with the back left vertical frame member and the back right vertical frame member;

a tool box having drawers, wherein the tool box is integrated with the load bearing horizontal rectangular platform, the rectangular frame base, and the each vertical frame member;

a foot stand assembly securely connected with the back end of the frame;

the foot stand assembly comprising a foot stand platform and the foot stand wheels;

wherein the foot stand platform is suspended above a riding surface and aligned with the load bearing horizontal platform while supporting the weight of a human; and

wherein the left foot stand wheel is positioned proximate to a left side of the foot stand platform and the right foot stand wheel is positioned proximate to a right side of the foot stand platform;

a power source connected with two motors wherein a first motor is connected with the left drive wheel and a second motor is connected with the right drive wheel, wherein in response to steering input transmitted from the steering control mechanism at least one motor transmits force to rotate the connected drive wheel to move and steer the riding device.

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